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A Review of the Neotropical Nirvaninae (Homoptera: Cicadellidae)

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The leafhopper subfamily Nirvaninae (= Nirvanidae of Metcalf 1963) is primarily an Old World assemblage with the greatest diversity of genera and species in tropical Asia. According to Metcalf's recent catalogue (1963), only two species are recorded from the Neotropics, *Carchariacephalus smithii* Baker and *Neonirvana hyalina* Oman. A third Neotropical species, *Columbonirvana aurea* Linnavuori, was described since the completion of Metcalf's catalogue. A study of both the described and undescribed Neotropical species reveals seven valid genera (five new) and seven valid species (four new). All specimens treated, unless stated otherwise, are in the collection of the United States National Museum.

Diagnosis of the Neotropical Nirvaninae. The following combination of characters will separate the members of this subfamily from all others: Form depressed; crown marginally carinate, at least apically, and strongly produced beyond eyes with median length at least as long as, but usually much longer than, distance between eyes (except *Columbonirvana*); ocelli on crown in front of eyes near lateral margins or rarely in anterior margin of crown.

KEY TO THE NEOTROPICAL GENERA OF NIRVANINAE

1. Upper portion of clypeus with a distinct but short median longitudinal carina (Figs. 1, 16, 24).....3
   Upper portion of clypeus without such a carina.....2

2. Forewing with one closed preapical cell (Linnavuori 1959: Fig. 13E); ocelli on crown near lateral margins and clearly visible from above (Fig. 20) ..... **Neonirvana** Oman
   Forewing without closed preapical cells (Linnavuori 1959: Fig. 13C); ocelli on anterior margin of crown and not visible from above (Linnavuori 1959: Fig. 13D) ..... **Columbonirvana** Linnavuori
3. Crown at least twice as long as distance between eyes (Figs. 2, 7, 12) 5
   Crown less than twice as long as distance between eyes (Figs. 18, 26) 4
4. Crown subpentagonal in outline and with a short distinctly elevated carina at apex (Fig. 18); veins of forewings uniformly distinct ..... **Pentoffia**, new genus
   Crown not pentagonal in outline and without a distinctly elevated carina at apex (Fig. 26); veins of forewings only apically distinct ..... **Jassosqualus**, new genus
5. Lateral margins of crown parallel (Fig. 2): clypellus sharply constricted at middle (Fig. 1) ..... **Krocodona**, new genus
   Lateral margins of crown converging distally (Figs. 7, 12); clypellus not constricted at middle (Figs. 6, 11) 6
6. Oblique ledge above antennal pit present (Fig. 13); third apical cell of forewing triangular (Fig. 14) ..... **Krocobella**, new genus
   Oblique ledge above antennal pit absent (Fig. 8); third apical cell of forewing quadrangular (Fig. 9) ..... **Krocozzota**, new genus

KROCODONA, new genus

Type-species: *Krocodona sauridion*, new species.

Form elongate, narrow, and parallel-sided; crown strongly produced beyond eyes, median length three times longer than narrowest width between eyes, in dorsal view lateral coronal margins parallel with apex broadly rounded, in lateral view carinate coronal margin strongly sinuate with face flat; in facial view clypellus strongly constricted mesally with short carina at apex of clypeus; pronotum laterally carinate; forewing with four apical and two preapical cells, third apical cell triangular. (This description will be expanded or modified when males are known.)

Krocodona, new genus is most similar to *Krocobella,* new genus. In both genera the crown is very strongly produced and the third apical cell of the forewing is triangular. They are, however, readily separated by other characters as indicated in the key to genera.

Krocodona sauridion, new species. Figures 1–5.

Length: Female 6 mm.

Structure: Antennae long, about as long as combined lengths of crown and pronotum (Fig. 3); surface of crown and scutellum finely granular; surface of pronotum weakly transversely rugulose.

Coloration: Venter including legs pale brown; face pale brown sparingly marked with dark brown to black near eyes, at antennal bases, mesally, marginally, and apically (Fig. 1); crown, pronotum, and scutellum pale brown marked with various hues between black and red-brown, coronal markings most distinct, with extreme apex black and discal markings as illustrated (Fig. 2); forewing pale brown hyaline, veins concolorous except apically, inner apical veins orange, outer apical veins dark brown, area of claval apex, costal margin, and area of second apical cell irregularly smoky brown (Fig. 4).

Male Genitalia: Male unknown.

Female Genitalia: Pregenital sternum with posterior margin mesally bilobed (Fig. 5).

Type: Holotype female (USNM Type No. 67141) La Fragua, Honduras, 29 October 1940, W. Komp.

Krocozzota, new genus

Type-species: *Krocozzota languria,* new species.

Form elongate and moderately stout; crown strongly produced beyond eyes, median length two and a half times longer than narrowest width between eyes; in dorsal view lateral coronal margins straight in front of eyes, then converging distally to acutely rounded apex; in lateral view carinate coronal

margin straight, carina only distinct apically, becoming obsolete toward eye, and with face not flattened; in facial view clypellus with sides parallel and a short carina at apex of clypeus; pronotum laterally carinate; forewing with four apical and two preapical cells, third apical cell quadrangular. (This description will be expanded or modified when males are known.)

Krocozzota, new genus is closest to *Krocobella,* new genus. In both genera the crown is very strongly produced and in lateral view the marginal coronal carina is straight or nearly so. The two genera are, however, readily separated by other characters as indicated in the key to genera.

Krocozzota languria, new species. FIGURES 6–10.

Length: Female 6 mm.

Structure: Antennal length unknown; surface of crown, lateral surfaces of pronotum and scutellum finely granular or scaly; mesal surface of pronotum very weakly transversely rugulose; mesal surface of scutellum nearly smooth.

Coloration: Venter including legs and face stramineous, unmarked except for extreme darkened upper portion of clypeus (Fig. 6); dorsum of abdomen largely red; crown, pronotum, and scutellum dark brown or black with a wide bright yellow mesal stripe, stripe narrowing toward coronal apex (Fig. 7); forewings subhyaline marked with hyaline yellow and dark brown (Fig. 9).

Male Genitalia: Male unknown.

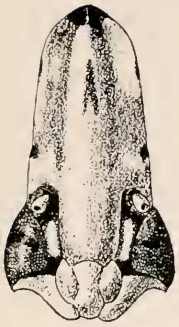
Female Genitalia: Pregenital sternum with posterior margin broadly produced and rounded (Fig. 10).

Type: Holotype female (USNM Type No. 67142) PANAMA, Canal Zone, 25 June 1952, F. S. Blanton.

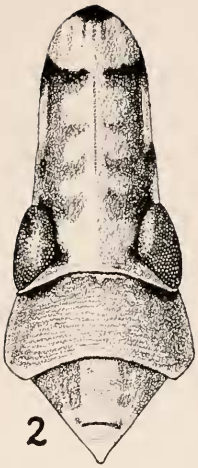
EXPLANATION OF FIGURES

FIGS. 1–5. *Krocodona sauridion* n.g. & n.sp.: 1, face; 2, crown, pronotum, and scutellum dorsally; 3, head and pronotum laterally; 4, apical portion of forewing; 5, pregenital sternum of female.

FIGS. 6–10. *Krocozzota languria* n.g. & n.sp.: 6, face; 7, crown, pronotum, and scutellum dorsally; 8, head and pronotum laterally; 9, forewing; 10, pregenital sternum of female.



1 sauridion



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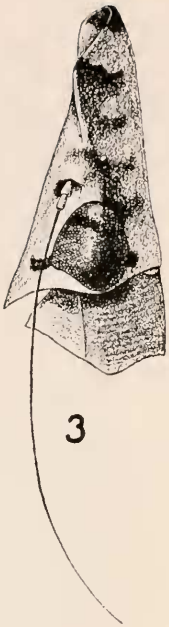

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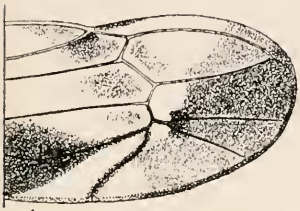

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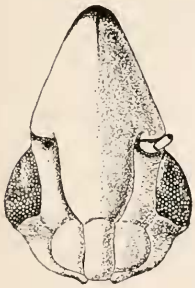
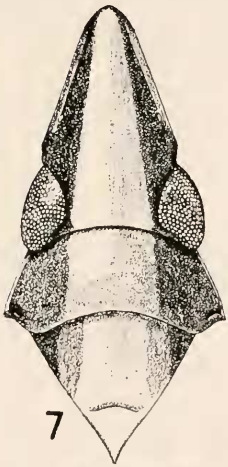


6 languria



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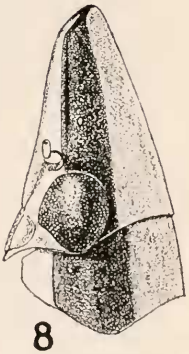

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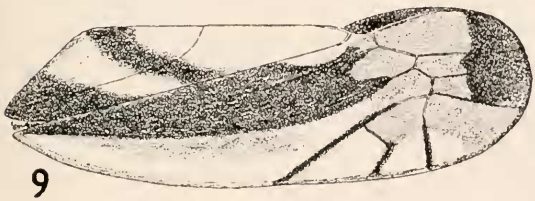

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KROCOBELLA, new genus

Type-species: *Krocobella colotes,* new species.

Form elongate and moderately stout; crown strongly produced beyond eyes, median length slightly more than two and a half times longer than narrowest width between eyes; in dorsal view lateral coronal margins straight in front of eyes, then converging distally to obtusely angled apex; in lateral view carinate coronal margins straight, or nearly so, with a distinct groove running from ocellus to coronal apex, a distinct oblique ledge above antennal base, and with face concave; in facial view sides of clypellus slightly expanded mesally, a short carina at apex of clypeus, and a single longitudinal submarginal groove along lateral edges of clypeus; pronotum laterally carinate; forewing with four apical and two preapical cells, third apical cell triangular. Male genitalia: pygofer relatively simple and without macrosetae; plates long and fused basally, lightly setose; valve lacking; connective Y-shaped with stalk bifurcate to receive base of aedeagus; style slender and hooked apically in lateral view; aedeagus simple.

Krocobella, new genus is apparently closest to the African genus *Hodoedoecus* Jacobi. Evans (1947: 175) illustrated the forewing (Fig. 17E), face (Fig. 17F), and crown, pronotum, and scutellum (Fig. 17G) of the type-species, *Hodoedoecus acuminifrons* Jacobi. The crown, pronotum, and scutellum are nearly identical in the two genera; compare figure 12 and Evans 1947: figure 17G. The faces are also quite alike; both have the short carina at the apex of the clypeus. However, the shape of the clypellus differs; in *Krocobella* the clypellus is expanded mesally (Fig. 11), while in *Hodoedoecus* the clypellus tapers downward (Evans 1947: fig. 17F). *Hodoedoecus* also apparently lacks the submarginal grooves along the edges of the clypeus found in *Krocobella.* There are many differences in the venation of the forewing; compare figure 14 and Evans 1957: figure 17E. The most obvious venational differences are these: clavus with two veins in *Hodoedoecus* and one in *Krocobella,* third apical cell quadrangular in *Hodoedoecus* and triangular in *Krocobella,* a basal cross vein present in *Hodoedoecus* but absent in *Krocobella.*

Krocobella colotes, new species. FIGURES 11–15.

Length: Male 5.75 mm.

Structure: Antennae long, about one and a half times longer than combined lengths of crown and pronotum (Fig. 13); surface of crown and scutellum finely granular or scaly; surface of pronotum weakly transversely rugulose.

Coloration: Venter including legs pale yellowish brown; irregular touches of dark brown on abdomen and thorax; face pale yellowish brown, darkened at antennal bases and black at apex of clypeus (Fig. 11); crown, pronotum, and scutellum pale yellowish brown, coronal suture and marginal coronal carinae red-brown (Fig. 12); forewing pale yellowish brown hyaline with veins and cells variably darkened with various shades of brown (Fig. 14).

Male Genitalia: Pygofer long with sharp points distally at both dorsal and ventral margins; plates with a few setae distally; aedeagus simple, narrowing and gradually recurving distally (Fig. 15). Aedeagus in ventral view slender with gonopore apical.

Female Genitalia: Female unknown.

Type: Holotype male (USNM Type No. 67143) Jussaral, Angra, Estado do Rio de Janeiro, BRAZIL, October, 1934, Travassos and Lopes.

PENTOFFIA, new genus

Type-species: *Pentoffia nivata,* new species.

Form elongate and broad; crown strongly produced beyond eyes, median length slightly longer than narrowest width between eyes; in dorsal view crown subpentagonal in outline with apical carina and irregular ridges on disc, ocelli highly obscure, head narrower than pronotum; in lateral view carinate coronal margin approximately straight, a distinct perpendicular ledge in front of antennal base; in facial view clypellus narrowing downward with a short carina at apex of clypeus, suture between clypeus and clypellus obscure; pronotum laterally carinate; forewing with four apical and three preapical cells, inner apical cell extraordinarily large, nearly twice longer and broader than

second apical cell, basal cross veins present, all veins strongly delineated. (This description will be expanded or modified when males are known.)

Pentoffia, new genus is not close to any other genus of the Nirvaninae, and its inclusion with this subfamily is provisional. The veins of the forewings are strongly delineated and the ocelli are highly obscure (distinctness of ocelli exaggerated in Fig. 18); both of these characters separate *Pentoffia* from all other genera of the Nirvaninae.

Pentoffia nivata, new species. Figures 16–19.

Length: Female 11.5 mm.

Structure: Antennal length unknown (Fig. 17 shows broken antenna); most of coronal surface finely but irregularly rugulose, weak ridges delimiting poorly defined pentagonal area on disc and line behind ocelli (Fig. 18), all margins of crown strongly carinate; surface of pronotum weakly transversely rugulose; surface of scutellum with basal angles finely granular and mesal portion irregularly rugulose; inner discal cells of forewing with two or three cross veins.

Coloration: Head, thorax, and abdomen stramineous to yellowish brown without definite markings; forewings milky hyaline and heavily pruinose.

Male Genitalia: Male unknown.

Female Genitalia: Pregenital sternum with posterior margin weakly produced and slightly indented mesally (Fig. 19).

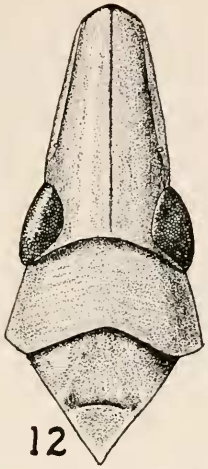
Type: Holotype female (USNM Type No. 67144) Cali Valle, Colombia, 27 April 1939, B. Losada. The type is damaged; it lacks all but one hind leg and the apical portion of both forewings.

Explanation of Figures

Figs. 11–15. *Krocobella colotes* n.g. & n.sp.: 11, face; 12, crown, pronotum, and scutellum dorsally; 13, head and pronotum laterally; 14, forewing; 15, male genital capsule laterally.

Figs. 16–19. *Pentoffia nivata* n.g. & n.sp.: 16, face; 17, head and pronotum laterally; 18, crown, pronotum, and scutellum dorsally; 19, pregenital sternum of female.

11 colotes



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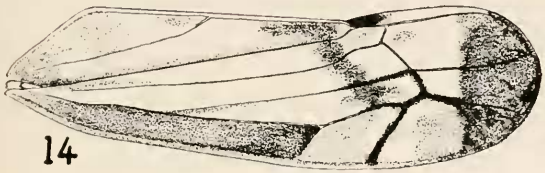

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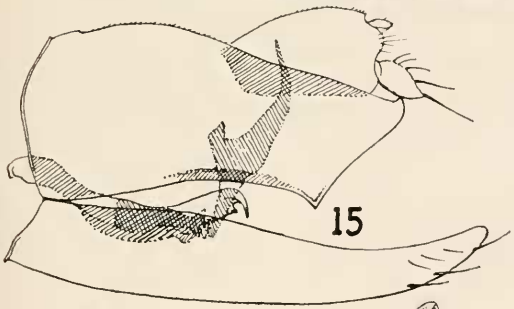

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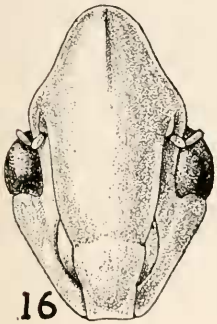

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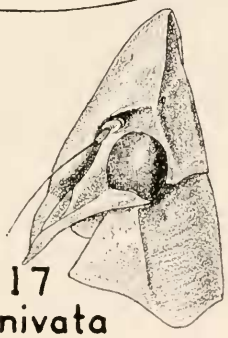
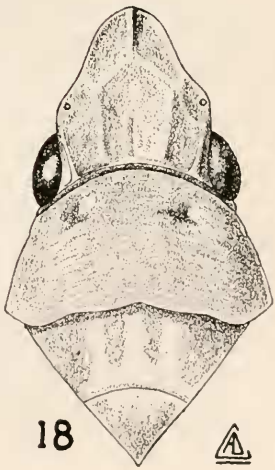


17
nivata



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JASSOSQUALUS, new genus

Type-species: *Carchariacephalus smithii* Baker.

Form elongate and slender; crown strongly produced beyond eyes, median length slightly longer than narrowest width between eyes; in dorsal view crown pointed apically with lateral margins broadly rounded, surface of crown not smooth, ocelli large, head narrower than pronotum; in lateral view carinate coronal margin straight, curving over eye to posterior margin of crown, antennal base in broad, deep, elongate depression in front of eye; in facial view clypellus narrowing downward with sides broadly rounded, a short carina at apex of clypeus, lora slender and elongate; pronotum laterally carinate; forewings with venation highly obscure but with four apical and two preapical cells, surface of forewing at least in part coriaceous. Male genitalia: pygofer with macrosetae along dorsal margin and brush-like modifications or scopae internally at apex; plates long and fused basally, with macrosetae apically; valve poorly developed or lacking; connective subcruciform; style with apex elongate and broadened apically in lateral view; aedeagus furcate apically.

Jassosqualus, new genus can be separated from the Old World genus *Carchariacephalus* Montrouzier by the following characters: In *Jassosqualus* the margins of the crown in dorsal view are broadly rounded with the coronal surface roughened (Fig. 26) and the lora are elongate (Fig. 24); in *Carchariacephalus* the margins of the crown in dorsal view are straight with the coronal surface smooth (Signoret 1879: pl. 1, Fig. 4) and the lora are rounded (Signoret 1879: pl. 1, Fig. 4b).

Jassosqualus smithii (Baker), new combination. FIGURES 24–29.

Carchariacephalus smithii Baker, 1897, p. 153.

Length: Male 5 mm. Female 5.5 mm.

Structure: Antennae of moderate length, about as long as crown (Fig. 25); surface of face finely granular or scaly with vague parallel ridges laterally on clypeus (Fig. 24); crown

longitudinally rugulose and irregularly punctate-rugulose basally with coronal suture just barely elevated (Fig. 26); pronotum weakly transversely rugulose; scutellum irregularly punctate-rugulose; forewing with clavus (except apex) and adjacent portion of corium, coriaceous and punctate, rest of forewing somewhat thickened but not coriaceous.

Coloration: Venters of abdomen and thorax, legs, and antennae stramineous; genital capsule and irregular areas on abdominal venter darkened; thoracic pleura, face, crown, pronotum, and scutellum black; forewing dark brown to black with an irregular yellow spot at claval apex and an irregular, elongate, subtriangular, yellow to hyaline area along costal margin, area occurs just anterior to the outer apical cell and about equal in length to the claval suture, the yellow to hyaline costal area broken by a narrow dark brown to black band at level of claval apex.

Male Genitalia: Genital capsule in ventral view with plates irregularly elongate; apex of pygofer with internal tooth and stout scopa on either side; connective twice pronged on either side for attachment to styles, and broadened near aedeagal base; styles slender and avicephaliform apically with "beaks" elongate; aedeagus somewhat rounded basally, shaft narrow, and apex quadrifurcate, gonopore presumably opening at base of quadrifurcation (Fig. 29). Genital capsule in lateral view with plates longer than pygofer; aedeagus somewhat S-shaped; style moderately broad with sharp expansions at apex, dorsal expansion longer and more slender than ventral extension (Fig. 28).

Female Genitalia: Pregenital sternum with posterior margin strongly produced laterally and medianly (Fig. 27).

Types: In Baker's original description of *smithii* he stated, "Described from two females collected at Rio [de] Janeiro [Brazil] in September and October, one female collected at Para [Brazil] in July [H. H. Smith]." The "female" collected at Rio de Janeiro in September is in fact a male; this male is hereby designated as the lectotype. In addition to the lectotype male, the female collected at Para in July and one female Benevides [Brazil] were studied.

NEONIRVANA Oman

Type-species: *Neonirvana hyalina* Oman.

Form elongate and moderately broad; crown strongly produced beyond eyes, median length nearly a third longer than narrowest width between eyes; in dorsal view carinate coronal margins straight in front of eyes, then converging to sharply rounded apex, surface of crown neither carinate nor rugulose, width of head and pronotum subequal; in lateral view carinate coronal margin straight or nearly so and terminating at eyes, a carina above antennal base, face flat; in facial view clypellus tapering downward with sides straight, suture between clypeus and clypellus highly obscure or absent, genae broad, no carina at apex of clypeus; pronotum laterally carinate; forewing with venation highly obscure, but with four apical and three preapical cells, third apical cell triangular, outer preapical short and nearly round, veins with a row of shallow pits along each side except apically, these pits usually set with very fine setae. Male genitalia: pygofer with macrosetae distally and irregular processes internally at apex; plates long and partially folded, beset with hairs and macrosetae; valve not strongly developed; connective Y-shaped; style slender and hooked in lateral view; aedeagus simple and tubular.

Neonirvana hyalina Oman. FIGURES 20–23.

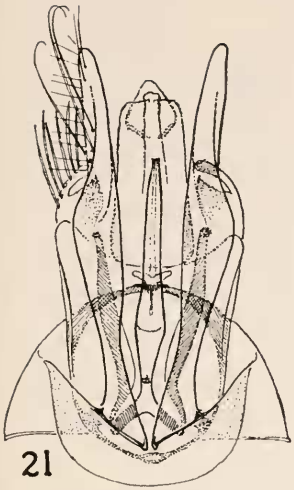
Neonirvana hyalina Oman, 1936, p. 117.

Length: Male 5–5.5 mm. Female 5.6–6.8 mm.

Structure: Antennae moderately long, about as long as combined lengths of crown and pronotum; surface of face finely granular; upper portions of clypeus with faint ridges laterally;

EXPLANATION OF FIGURES

FIGS. 20–23. *Neonirvana hyalina* Oman: 20, crown, pronotum, and scutellum dorsally; 21, male genital capsule ventrally; 22, male genital capsule laterally; 23, pregenital sternum of female. FIGS. 24–29. *Jassosqualus smithii* (Baker), new genus: 24, face; 25, head and pronotum laterally; 26, crown, pronotum, and scutellum dorsally; 27, pregenital sternum of female; 28, male genital capsule laterally; 29, male genital capsule ventrally.



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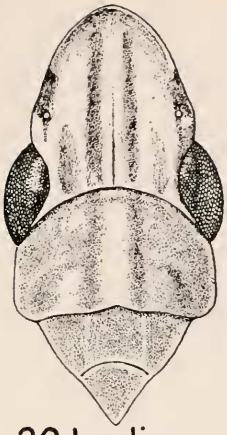
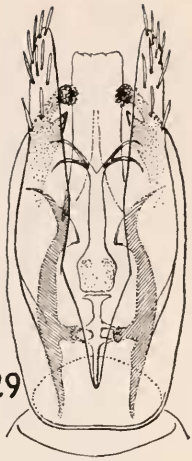


20 hyalina



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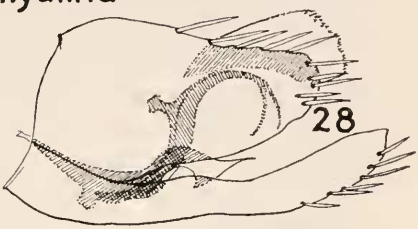

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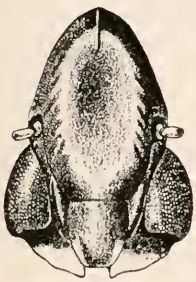
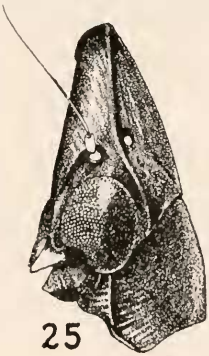


24 smithii



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crown, pronotum, and scutellum mainly smooth but with some weakly defined granular areas; pronotum at times with vague transverse rugulae laterally; forewing hyaline but surface not smooth, basal cross vein usually present, clavus with one proximally forked vein (Oman 1936: Fig. 1C).

Coloration: General ground color stramineous to pale lemon yellow; venter including legs and face stramineous; crown, pronotum, and scutellum sordid stramineous to pale yellow; in well-marked specimens, a pair of narrow longitudinal mesal orange stripes on crown extending posteriorly on to pronotum and scutellum, the stripes often broadened on pronotum fade to white on scutellum, often with additional orange markings in front of eyes on coronal margins (figure 20 shows a heavily marked specimen); forewings heavily suffused with lemon yellow but usually irregularly pale along costal margin and at apex, always with a distinct brown spot at base of third apical cell.

Male Genitalia: Genital capsule in ventral view: plates with both setae and hairs at narrowed apical portion; apex of pygofer with internal tooth and hook on either side; both connective and aedeagus narrowed at point of juncture, aedeagus and connective connected by a movable joint; styles uniformly slender and somewhat rounded apically; aedeagus long, slender, and tapering both basally and apically, gonopore terminal (Fig. 21). Genital capsule in lateral view: plates widest apically, longer than pygofer, hairs dorsally and apically, and setae in two areas ventrally; pygofer with a fold in distal third; valve moderately distinct; aedeagus relatively straight and irregularly truncate at apex; style slender and hooked apically (Fig. 22).

Female Genitalia: Pregenital sternum with posterior margin medianly bilobed and with a partial longitudinal carina at middle (Fig. 23).

Specimens Studied: Holotype male and type series from San Pedro de Montes de Oca, Costa Rica, 31 January 1936, E. H. Ballou; long series of both males and females collected in light traps at various localities in Panama and the Canal Zone 1951–1953 by F. S. Blanton; two females Jussaral, Angra, Estado do Rio de Janeiro, Brazil, 9 October 1934, Travassos and Lopes.

COLUMBONIRVANA Linnavuori

Type-species: *Columbonirvana aurea* Linnavuori.

I have not seen the type or any specimens representing this monobasic genus. All of the following is extracted from the original description. *Columbonirvana* can be separated from all other Neotropical genera of the Nirvaninae by the placement of the very small ocelli which lie in the anterior margin of the crown and are not visible from above, and by the coronal length which is less than the narrowest width between the eyes.

The type-species and only included species, *Columbonirvana aurea* Linnavuori (1959: p. 35), is based upon a unique female with data Sierra S. Lorenze, Colombia, March 1912, Ujhelyi; the type is in the collection of the Moravian National Museum in Brno, Czechoslovakia. Linnavuori (1959: p. 35) illustrated the crown and pronotum (Fig. 13D) and forewing (Fig. 13C). The species is small, length 4.5 mm., and is colored as follows: venter, legs, and face pale yellow; upper portion of face with a pair of transverse, narrow bright red stripes, lower stripe broken at middle; crown silver-white near anterior margin, bright yellow basally; pronotum bright yellow anteriorly, basal part pale yellow; scutellum mostly golden yellow; forewing hyaline, clavus and adjacent parts of corium broadly golden yellow, costal margin, patches in cells and two faint transverse spots in clavus and corium, whitish hyaline, apical cells with fuscous areas, third apical cell with a conspicuous triangular black-brown spot. Pregenital sternum rather large with posterior margin sharply triangularly produced.

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A Note on the Synonyms of Anaphothrips zeae Moulton (Thysanoptera, Thripidae) *

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This paper reports a new synonym of *Anaphothrips zeae* Moulton discovered during the compilation of the species index of the genus *Anaphothrips.*

Crawford (1910) first described this species from Claremont, California, as *Anaphothrips longipennis* Crawford. Moulton (1911) also described this species as *Anaphothrips zeae* without reference to Crawford's description. Karny (1912) then transferred this species to the genus *Scirtothrips* Shull, 1909. Subsequently, Hood (1914) transferred *Euthrips longipennis* Bagnall, 1909, to *Scirtothrips,* thus creating homonymy in the genus *Scirtothrips.* Because of this homonymy Priesner (1932) changed Crawford's name *A. longipennis* to *Scirtothrips crawfordi.* Finally, Baily (1944 and 1957) put Crawford's species back in its original genus *Anaphothrips* Uzel, 1895.

When Moulton (1911) described *Anaphothrips zeae* (species no. 57), he used another specific name *Anaphothrips hesperus* in the key (page 17) instead of *A. zeae* Moulton.

However, elsewhere in the same paper he used *A. zeae:* in the catalogue on page 28, in the description on page 41, and in the illustration on plate 5.

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